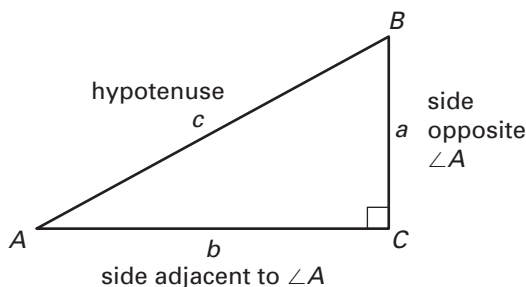


Study Guide

For use with pages 488–493

GOAL Use tangent to find side lengths of right triangles.

VOCABULARY



A **trigonometric ratio** is a ratio of the lengths of two sides of a right triangle. The **tangent** of an acute angle of a right triangle is the ratio of the length of the side opposite the angle to the length of the side adjacent to the angle.

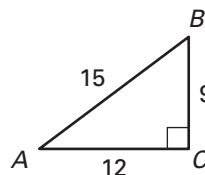
$$\tan A = \frac{\text{side opposite } \angle A}{\text{side adjacent to } \angle A} = \frac{a}{b}$$

EXAMPLE 1 Finding a Tangent Ratio

For $\triangle ABC$, find the tangent of $\angle A$.

Solution

$$\tan A = \frac{\text{opposite}}{\text{adjacent}} = \frac{9}{12} = \frac{3}{4}$$



Exercise for Example 1

- For $\triangle ABC$ in Example 1, find $\tan B$.

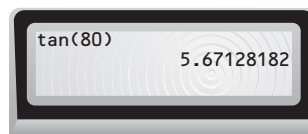
EXAMPLE 2 Using a Calculator

Use a calculator to approximate $\tan 80^\circ$.

Keystrokes

2nd [TRIG] ◀ ◀ = 80) =

Display



Answer: $\tan 80^\circ \approx 5.6713$

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Exercises for Example 2

Use a calculator to approximate the tangent value to four decimal places.

2. $\tan 10^\circ$

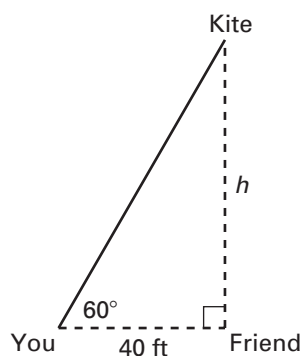
3. $\tan 0^\circ$

4. $\tan 57^\circ$

5. $\tan 35^\circ$

EXAMPLE 3 Using a Tangent Ratio

You are flying a kite. The string is taut and makes an angle of 60° with the ground. Your friend is standing directly under the kite 40 feet away from you. What is the height h of the kite to the nearest foot?

**Solution**

Use the tangent ratio. In the diagram, the length of the leg opposite the 60° angle is h . The length of the adjacent leg is 40 feet.

$$\tan 60^\circ = \frac{\text{opposite}}{\text{adjacent}} \quad \text{Definition of tangent ratio}$$

$$\tan 60^\circ = \frac{h}{40} \quad \text{Substitute.}$$

$$1.7321 \approx \frac{h}{40} \quad \text{Use a calculator to approximate } \tan 60^\circ.$$

$$69.284 \approx h \quad \text{Multiply each side by 40.}$$

Answer: The height of the kite is about 69 feet.

Exercises for Example 3Find the value of x . Round to the nearest tenth.